Forest Insect & Disease Management

Report No. 80-1-14
June 1980

BIOLOGICAL EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON HARTWELL LAKE (SOUTH CAROLINA - GEORGIA)

by

William H. Hoffard

ABSTRACT

An aerial survey and ground check of 8,000 acres including 5,200 acres of susceptible host at Hartwell Lake showed an estimated 50 active southern pine beetle spots containing an estimated 61.4 MBF of infested timber. Forest Insect and Disease Management recommends that any of several Forest Service approved procedures be used to control the infestations (preferably salvage cutting).

INTRODUCTION

At the time of this writing, much of the states of South Carolina and Georgia are in the midst of a southern pine beetle outbreak (Remion, 1980). Hartwell Lake (a Corps of Engineers project) straddles both state lines and falls well within counties classified as "outbreak" (in excess of 1 multiple tree spot per 1,000 acres of host type).

While no specific records exist for southern pine beetle infestations on the lake, records from the adjacent Long Cane Division of the Sumter National Forest indicate two periods of very heavy southern pine beetle activity since 1963. Figure 1 shows numbers of multiple tree spots per 1,000 acres of host type in each of these outbreak years and population trends for the past 17 years.

SOUTHEASTERN AREA, STATE & PRIVATE FORESTRY
USDA FOREST SERVICE, ATLANTA, GA 30309

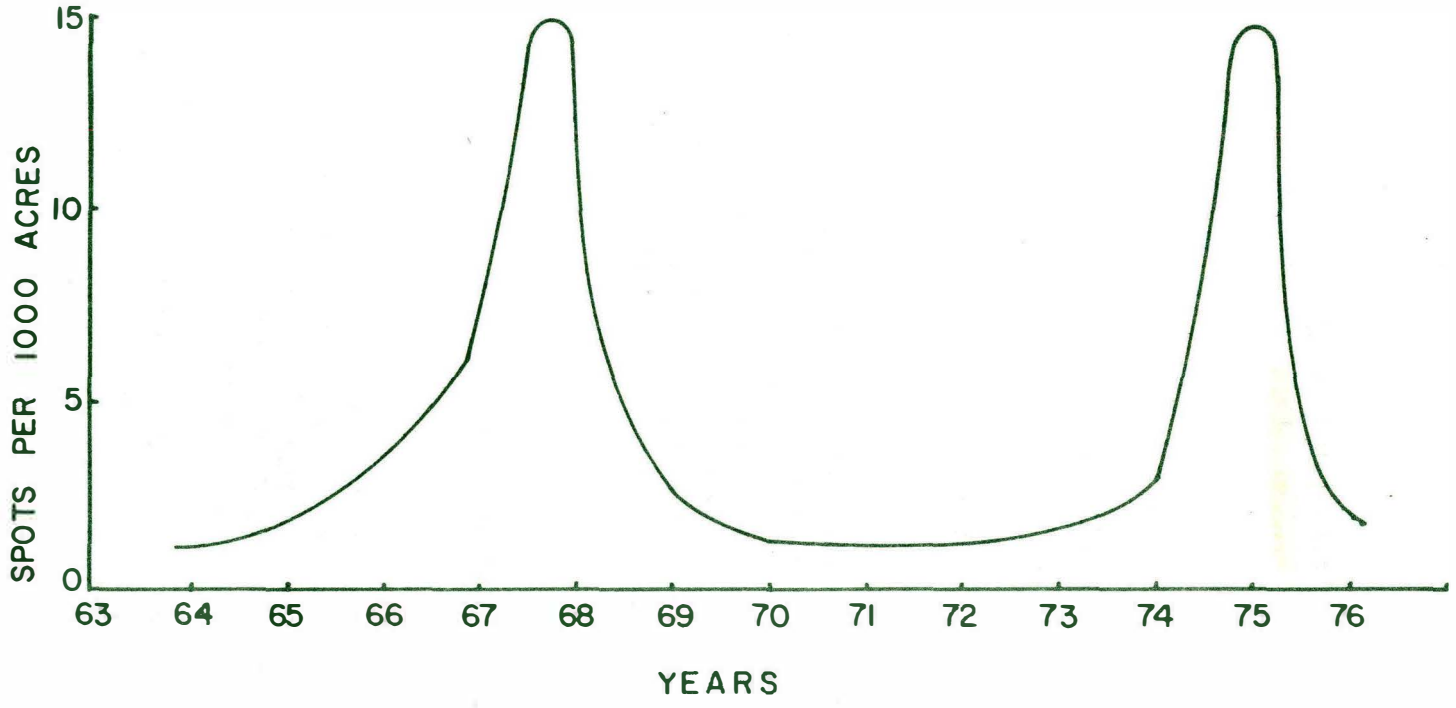

Figure 1.--Periodic fluctuations in southern pine beetle populations in Long Cane R.D.

In April of 1980, Forest Insect and Disease Management conducted a biological evaluation to determine the status of southern pine beetle infestations and possible need for suppressive measures.

METHODS

On March 31, 1980, the Aerial Survey Team of Forest Insect and Disease Management conducted a 50 percent aerial survey of Corps of Engineers lands adjacent to Hartwell Lake (Bassett, 1980). Areas of dead and dying pine were marked on county maps and classified by size class. A composite map was then forwarded to the Asheville Field Office for use in ground checking during the week of April 21.

In the ground check phase of the survey, 11 spots were randomly selected proportionate to spot size class distribution (1-10, 11-25, 26-50, 51-100, and 100+). Each spot was visited and examined to determine cause of mortality. Southern pine beetle infested trees were measured to determine volume, and red infested ratios were taken to project total volumes based on aerial survey data. Additionally, age and basal area were measured.

RESULTS

Table 1 shows results of the aerial survey and Table 2 shows results of the ground survey. The data show 9.6 spots per 1,000 acres of host type. Beetle activity is concentrated around the north fork of the lake near Clemson University (figure 2). Over 90 percent of red trees were infested at ground check time.

An estimated 61.4 MBF are currently infested. Based on spot proliferation data taken on the nearby Oconee National Forest, this represents a potential loss of 245.6 MBF if spots are not controlled.

RECOMMENDATIONS

A southern pine beetle suppression project should be initiated on reservoir lands. Depending on individual spot situations, any of several direct control techniques may be used. These should be supplemented by preventive measures which will discourage spot development and proliferation.

Table 1.--Size categories of suspected southern pine beetle spots, number of spots by size category, and numbers of trees per spot (original aerial survey data) - Hartwell Lake, Georgia - South Carolina.

	Spot Size Category					
	1-10	11-25	26-50	51-100	100+	All
No. of spots	13	5	6	1	0	25
No. of trees	47	64	220	100	0	431
$\bar{x}$ trees	3.6	12.8	36.6	100.0	0	16.8

Table 2.--Size categories of southern pine beetle spots, number of spots by size category and numbers of trees per spot (expanded and corrected aerial survey data) - Hartwell Lake, Georgia - South Carolina.

	Spot Size Category					
	1-10	11-25	26-50	51-100	100+	All
No. of spots	26	10	12	0	2	50
No. of trees	99	136	466	0	212	913
$\bar{x}$ trees	3.8	13.6	38.8	0	106	18.3

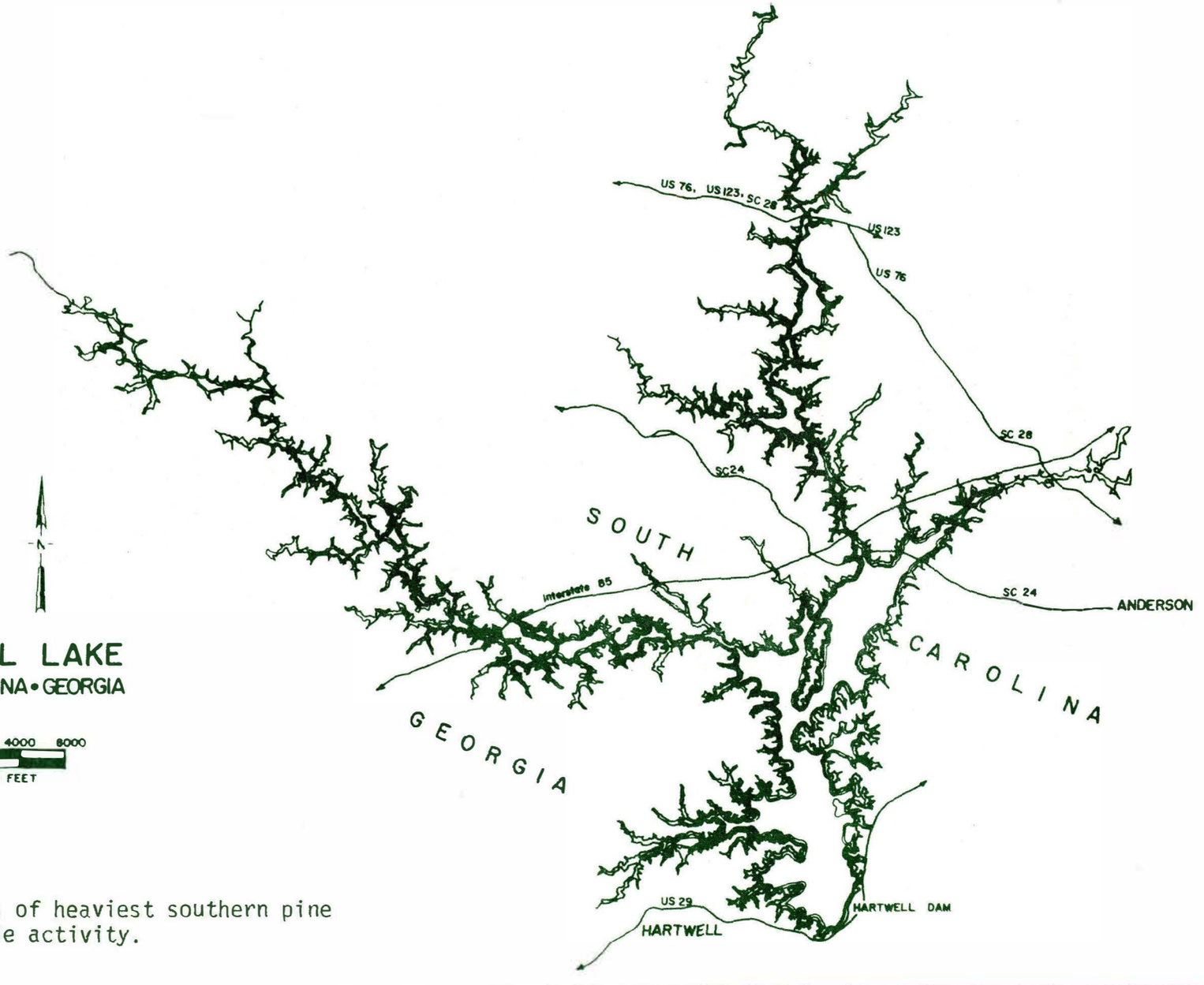

Figure 2.--Areas of heaviest southern pine beetle activity.

CURRENT DIRECT SUPPRESSION RECOMMENDATIONS

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

   When practical, and if host type is present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. This practice is effective in reducing the possibility of "breakouts." When only a small volume of infested merchantable material occurs in a spot, noninfested trees surrounding the spot may be marked to provide an operable cut.

   The order of priority of removing beetle-infested timber from a spot should be as follows:

   -- Trees in the buffer zone at the head(s) of the spot - if not removed within 2 weeks of marking, another visit and talley must be made in order to insure removal of all infested trees and an adequate buffer strip.

   -- Trees with fresh attacks and having young broods (usually the green, recently infested trees).

   -- Trees having nearly developed broods (usually the red and fading trees).

   Remove infested trees from National Forest lands by commercial sale or administrative procedures in accordance with guidelines and procedures set forth in FSM 2400 through 2490.

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph (1) under "Removal of Infested Trees by Commercial Sale or Administrative Use." Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts," every effort should be made to locate and treat all green infested trees during the piling and burning operation.

3. Chemical Control. The chemical formulation recommended for southern pine beetle control is a ½ percent lindane spray with water as the carrier. This may be formulated from a 20 percent lindane emulsifiable concentrate at the rate of 11 pints of concentrate in enough water to make 55 gallons of spray. (Ratio of one part 20 percent lindane EC to 39 parts water.)

   Dursban® (chlorpyrifos) is also registered for southern pine beetle control. It is available as a liquid containing 4 pounds of insecticide per gallon of concentrate. The spray is prepared by mixing 2 2/3 fluid ounces of concentrate with water to make 1 gallon or 2.1 gallons of concentrate in 100 gallons of water. Dursban® is to be applied only by or under the supervision of a certified pest control operator or other trained personnel responsible for insect control programs.

   Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of runoff. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Low pressure sprayers may be used to treat large accessible infestations.

   The order of priority for cutting and spraying infested trees in large spots is the same as paragraph (1) under "Removal of Infested Trees by Commercial Sale or Administrative Use." Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts," every effort should be made to locate and treat all green infested trees during the chemical control operation.

   Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development.

   Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in Section 8.3 of the Forest Service Health and Safety Code FSM 5242.21.

4. Cut-and-leave. This control tactic reduced losses from spot growth and proliferation during the summer months. Cut-and-leave is designed to disrupt spot growth in small to medium-sized spots (40 active trees) by dispersing emerging beetles. These spots can be salvaged when markets or weather permit. Trees are still suitable for sale months after felling.

The following procedure is to be followed when using cut-and-leave:

(1) Identify all active trees within the spot.

(2) Fell all active trees within the spot.

(3) Fell a horseshoe-shaped buffer of green, uninfested trees around the most recently attacked trees at the head of the spot and leave them lying on the ground with crowns pointed toward the center of the spot. The buffer should be as wide as the average height of the trees in the stand.

Cut-and-leave treatments should only be applied during the summer months between June and October. Spots with 10 or more infested trees should be treated first. As time permits, spots with 10 infested trees should also be treated if they contain trees with fresh attacks. In these smaller infestations where a specific head is not distinguishable, an adequate buffer strip (equivalent to the average height of the stand) and all infested and green uninfested trees within the spot should be felled.

Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated or cut and left within 2 or 3 weeks after treatment to check for additional infested trees. If additional trees are found, treat them.

In any area where infested trees are cut for chemical control, piling and burning, cut-and-leave or removed through commercial sales and administrative use procedures, stumps adjacent to living pine trees should be treated to control or prevent the root rot Fomes annosus.

Stands that have been previously thinned or have had a history of F. annosus infection, stumps should be treated with the competing fungus, Peniophora gigantea.

Stands that have no history of F. annosus and have never been thinned, the stumps should be treated with borax.

Southern pine beetle infested tree stumps cut during the period of May through August, and below 34° N. latitude do not have to be treated with either of the above materials. This is because few spores are formed during this period and high temperatures often kill spores that are produced. However, routine summer thinning in areas of southern pine beetle buildup is not recommended.

PREVENTIVE MEASURES

The preceeding represents only short-term, immediate control strategies. Preventive measures must be taken to help ward off further southern pine beetle infestations in noninfested stands. Some of the more significant preventive measures include:

1. Preventing or minimizing littleleaf disease, a condition which predisposes these weakened trees to beetle attack. Depending on severity of infection, diseased trees may be removed during normal thinnings, on a 6-year cutting cycle or as soon as merchantable. In high-hazard areas or in replanting known littleleaf sites, use loblolly pine or a more resistant tree species, as opposed to shortleaf pine.

2. Harvesting mature and overmature stands. Such stands are vulnerable to beetle attack and should be harvested as soon as possible.

3. Thinning stagnated stands. Overstocked stands are low in vigor and are more likely to be attacked. They should be thinned to a point that trees again show thrift and vigor.

4. Minimizing impact of natural disturbances which causes stand stress. These factors include ice, wind, hail, and animal damage, flooding, erosion, poor soil fertility, etc. Corrective measures include removal of individually damaged trees, wholesale salvage, improving drainage, fertilization, etc.

5. Minimizing or eliminating man-caused disturbances. Logging, pipeline, sewerline, and powerline construction, and other construction activities require use of heavy equipment which causes tree skinning and soil compaction and significantly weakens trees. Efforts to minimize the damaging consequences of these activities can significantly reduce the possibility of their leading to southern pine beetle problems.

PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key--out of reach of children and animals--away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you used for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary landfill dump, or crush and bury them in a level isolated place.

NOTE: Some states have restrictions on the use of certain pesticides. Check your state and local regulations. Also, because registration of pesticides are under constant review by the U. S. Department of Agriculture, consult your county agricultural agent or state extension specialist to be sure the intended use is still registered.

LITERATURE CITED

Bassett, R. 1980. Aerial survey of forest insect and disease activity. Corps of Engineers, Lake Hartwell and vicinity. USDA Forest Service, S&PF, FIDM, Rep. No. 80-3-12.

Remion, M. 1980. Southern pine beeble report No. 5. South Carolina State Commission of Forestry.